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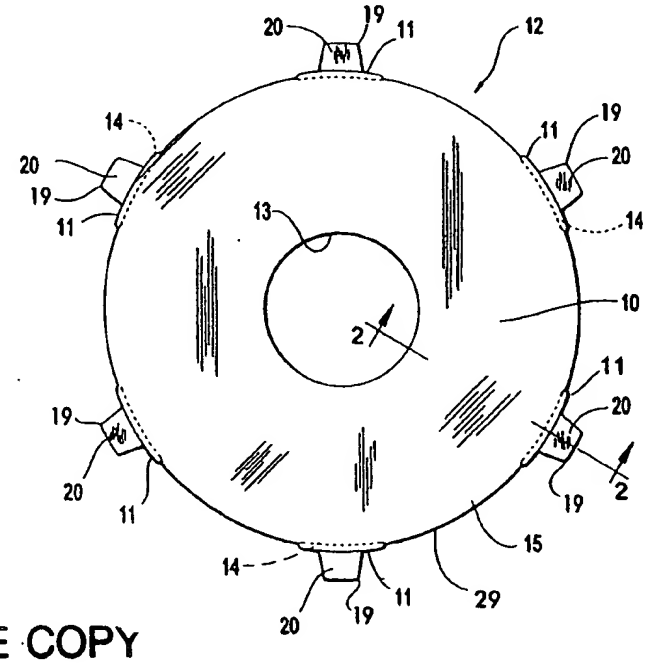
(54) Title: OPTICAL DISC PROTECTOR AND METHOD FOR APPLYING SAME

(57) Abstract

A protective cover (12) for an optical disc readable by a disc reader having a laser. The optical disc (40) has a periphery, a data-read side and a non-data-read side opposite the data-read side. The cover includes a disc of material capable of transmitting light emitted by a laser. The transmitting disc (15) is applicable to the data read side of the optical disc to cover the data-read side. The transmitting disc further comprises a gripper (19) at its periphery for being disposed around the periphery of the optical disc and engaged with the optical disc to hold the transmitting disc generally flat opposite the data-read side of the optical disc without blocking transmission of light emitted by the laser to the data on the optical disc. A method for applying a protective cover to an optical disc. A protective covering apparatus having a protective cover and an alignment device (38) for alignment of the cover on an optical disc.



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OPTICAL DISC PROTECTOR AND METHOD FOR APPLYING SAME

Background of the Invention

This invention relates generally to the protection of optical discs and more particularly to the protection of compact discs and CD-ROM's from surface scratches.

Optical discs, and especially those commonly known as compact discs (CD's and CD-ROM's) are typically used as a storage medium for audio and video data, computer software programs, and other data. Such discs have an aluminum coated pit track containing data that is encased by protective layers of polycarbonate plastic in both the label (non-read) side and the data-read side. The optical characteristics of the protective layer enable an optical laser pickup to be focused on the pit track on the data-read side of the disc through the protective layer. However, if the protective layer on the data-read side becomes scratched, permanent mistracking and skipping problems can occur due to the laser beam becoming misdirected. Furthermore, severe scratches that penetrate to the pit track can destroy the data contained therein.

Certain devices that provide surface protection for compact discs have provided protection only during storage, but not during use. Other devices that provide surface protection during use have been secured to the data-read side of the compact disc by applying adhesive to the shield surface. These latter devices have many drawbacks, including the adhesive interfering with the data being read. Moreover, they typically employ a cover that is not easily replaced if scratched or damaged.

Accordingly, there is a need for a disc protector that provides protection to the disc when in use as well as when in storage and which does not

interfere with the reading of the data contained on the disc.

Summary of the Invention

Among the several objects of this invention, therefore, are a protective cover that protects an optical disc from surface scratches during use; does not interfere with the data being read from the disc; is replaceable; is economical to manufacture; and is easy to secure to an optical disc.

Briefly, therefore, the invention is directed to a protective cover for a laser-readable optical disc, the cover comprising a transmitting disc of material capable of transmitting light emitted by a laser, which transmitting disc is applicable to the data-read side of the optical disc to cover it. The cover further has a gripper at the periphery of the transmitting disc for being disposed around the periphery of the optical disc and engaged with the non-data-read side of the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to the data on the optical disc.

The invention is also directed to a cover for a laser-readable optical disc, which cover has a transmitting disc of material capable of transmitting light emitted by a laser, and being applicable to the data-read side of the optical disc to cover it. The cover also has a plurality of tabs extending generally radially outwardly from the transmitting disc and being bendable around the periphery of the optical disc and adhesively securable to the non-data-read side of the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to data on the optical disc.

The invention is further directed to a cover for a laser-readable optical disc, the cover having a transmitting disc of material capable of transmitting light emitted by a laser and being applicable to the data-read side of the optical disc to cover it. The cover has a gripper comprising a flange at the periphery of the transmitting disc for being disposed around the periphery of the optical disc and engaged with the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to data on the optical disc.

The invention is also directed to a method for applying a disc cover to an optical disc involving placing a transmitting disc over an alignment device, the transmitting disc comprising a disc of material capable of transmitting light emitted by a laser and having a plurality of tabs extending generally outwardly from the transmitting disc at spaced intervals around the periphery of the transmitting disc, the alignment device comprising a round plate having an outer diameter and a plurality of alignment ears extending radially outward and parallel to the plate, a transmitting disc guide for centering the transmitting disc on the alignment device and an optical disc guide for centering the optical disc on the alignment device. The optical disc is then placed over the transmitting disc onto the optical disc guide of the alignment device, and the tabs are folded over the optical disc and secured to the non-data-read side of the optical disc.

Still further, the invention is directed to a protective covering apparatus for a laser-readable disc comprising a transmitting disc of material capable of transmitting light emitted by a laser, a gripper at the periphery of the transmitting disc for being disposed around the periphery of the optical disc and engaged with

the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to data on the optical disc, and an alignment device comprising a generally round plate for supporting the transmitting disc, a transmitting disc guide on the plate for centering the transmitting disc on the alignment device and an optical disc guide on the plate for centering the optical disc on the alignment device, the transmitting disc guide and optical disc guide cooperating to facilitate proper alignment of the transmitting disc on the optical disc.

Other objects and features will be in part apparent and in part pointed out hereinafter.

Brief Description of the Drawings

FIG. 1 is a plan view of a disc cover of the present invention;

FIG. 2 is a partial cross-sectional view of the disc protector taken in the plane including line 2--2 of FIG. 1;

FIG. 3 is a plan view of an alignment device for use with the disc protector of the present invention;

FIG. 4 is cross-sectional view of the disc protector taken in the plane including line 4--4 of FIG. 3;

FIG. 5 is a perspective view illustrating the steps in the method of this invention involving applying the disc protector of FIG. 1 to a compact disc utilizing the alignment device of FIG. 3;

FIG. 6 is a perspective view of a second embodiment of the disc protector of this invention;

FIG. 7 is a perspective view of a third embodiment of the disc protector of this invention; and

FIG. 8 is a perspective view of a fourth embodiment of the disc protector of this invention.

Corresponding parts are designated by corresponding reference numerals in the several views of the drawings.

Detailed Description of the Preferred Embodiments

Referring now to the drawings, and first to Fig. 1, there is generally indicated at 12 a cover for an optical disc 40 such as shown in Fig. 5 readable by a disc reader (not shown) using a laser to transmit light to the optical disc for reading data on the disc. The optical disc 40 is of the type having a data-read side 41 and a non-data-read side 43 opposite the data-read side. Optical discs 40 typically have an aluminum coated track containing data that is encased by protective layers of plastic. The plastic's optical characteristics enable the optical laser pickup to be focused on the track through the data-read side of the disc. The cover 12 is used to prevent the plastic surface on the data-read side 41 from becoming scratched.

The cover 12 comprises a disc 15 of material capable of transmitting light emitted by a laser, in the sense that the material allows such light to pass through. The transmitting disc 15 is applicable to the data-read side 41 of the optical disc 40 to cover the data-read side. The transmitting disc 15 has an opening 13 in the center thereof, corresponding to a circular ridge located on the data-read side 41 of the optical disc 40 and generally concentric with a periphery 47 of the optical disc. The transmitting disc 15 has a diameter slightly smaller than the diameter of the optical disc 40 to avoid any separation between the optical disc and the transmitting disc upon exposure to friction at an outer ring of the optical disc. The outer ring of the optical disc 40 does not contain data and therefore does not require protection by the transmitting disc 15. The transmitting disc 15 is made from a

material that is preferably scratch resistant, but the material does not have to be scratch proof since the cover 12 can be replaced if the transmitting disc becomes scratched. The data is read optically from the optical disc 40 through the transmitting disc 15, thus the material must not interfere with the reading of the data on the optical disc 40. The transmitting disc 15 is transparent in the sense that it allows signals to pass through the disc during data-read operations, but need not be transparent in the sense that the human eye can see through it nor in the sense that signals not critical to the data-read operation must be able to pass through it. The transmitting disc 15 preferably has optical properties that minimize the distortion and attenuation of encoded light signals which pass through the transmitting disc. The transmitting disc 15 is made from a polycarbonate material or other suitable material and preferably has a thickness of between 0.002 and 0.006 inches. The transparency of the preferred polycarbonate material is approximately 92% at wavelengths in the region of 0.4 to 0.5 microns.

The transmitting disc 15 has a gripper at its periphery 29 extending outwardly therefrom for being disposed around the periphery of the optical disc 40 and engaged with the optical disc to hold the transmitting disc generally flat on the data-read side 41 of the optical disc. The gripper adheres exclusively to the non-data-read side 43, thus eliminating the risk associated with other disc protectors of damaging or interfering with the data. Preferably, the gripper does not interfere with the transmission of light emitted by the laser to any of the data on the optical disc, but at a minimum the gripper does not interfere with transmission of such light sufficiently to detract from the audio signal, video signal, or other signal relayed by the disc reader. As shown in Figs. 1-3, the gripper

for holding the transmitting disc 15 on the data-read side 41 of the optical disc 40 comprises a plurality of tabs 19 extending generally radially outwardly from the transmitting disc at spaced intervals around the periphery 29 of the transmitting disc. The tabs 19 are flexible so that they can be bent around the periphery of the optical disc 40 and adhesively secured to the non-data-read side 43 of the optical disc. The tabs 19 include an inner portion 14 in face-to-face adhesive engagement with one face of the transmitting disc 15 constituting its outside face 16 and an outer portion 20 lying outward of the periphery 29 of the transmitting disc 15. The inner portion 14 of each tab 19 is secured by adhesive to the outside face 16 of the transmitting disc 15 onto ears 11 extending from the transmitting disc. The ears 11 are spaced at intervals around the periphery 29 of the disc 15 and have outer edges on a circle centered in the center of the transmitting disc 15 and having a diameter generally corresponding to the diameter of the optical disc 40. The inner portion 14 of the tabs 19 are generally shaped to correspond to the ears 11. The distance that the ears 11 extend out beyond the periphery 29 of the transmitting disc 15 generally corresponds to the width of the outer ring of the optical disc 40 which does not contain any data. Thus, the material of the tab 19 does not have to be light-transmitting. The ears 11 may be integrally formed with the transmitting disc 15 or may be formed separately and secured to the transmitting disc. Each tab 19 includes a protective cover 21 on the adhesive on the outer portion 20 of the tab adapted to be removed to expose the adhesive on the outer portion. The adhesive on the tabs 19 is sufficiently strong so as to secure the transmitting disc 15 to the optical disc 40 during normal handling and use in the data reader, while allowing the transmitting disc to be easily removed in the event that

replacement is necessary. As shown in Fig. 1, the cover 12 includes six evenly spaced ears 11 and corresponding tabs 19. The number of tabs and the size may vary as long as the surface area of the inner portion 14 of the tabs is sufficient to hold the transmitting disc 15 onto the optical disc 40. Tabs 19 may be in shapes other than that shown and still fall within the scope of the invention. The tabs 19 are preferably made of a material having an elastic nature which creates an outward tension on the transmitting disc 15 to assure sufficient contact between the transmitting disc and the data-read side of the optical disc. The tabs 19 preferably have a thickness of approximately .0015 inches and are made of polyester or other suitable material.

A method for applying the transmitting disc comprises: placing a transmitting disc as described above, over an alignment device, generally indicated at 38 (Figs. 3-4), the alignment device 38 comprising a round plate 31 having an outer diameter and a plurality of alignment ears 37 extending radially outward and parallel to the plate, a transmitting disc guide 32 for centering the transmitting disc on the alignment device and an optical disc guide 33 for centering the optical disc on the alignment device; placing the optical disc 40 over the transmitting disc onto the optical disc guide of the alignment device; folding the tabs 19 over the optical disc and securing the tabs to the non-data-read side 43 of the optical disc; and removing the alignment device.

The alignment device 38 provides a convenient device and method for applying the transmitting disc 15 so as to minimize handling of the transmitting disc and optical disc 40 and ensure proper concentric alignment of the transmitting disc and optical disc. As shown in Figs. 3 and 4, transmitting disc guide 32 comprises a raised circular flange adapted to fit within an opening

13 formed in the center of the transmitting disc 15 and the optical disc guide 33 comprises a raised shoulder adapted to fit within an opening 42 in the center of the optical disc 40. A groove 39 is located inwardly from the raised shoulder 32 to compensate for variations in the location of a circular rib (not shown) typically found on optical discs. The raised shoulder 32 has an outer edge that engages with an inner edge of the transmitting disc adjacent the opening 13 of the transmitting disc. The raised shoulder 32 helps to center the transmitting disc 15 on the alignment device 38. The optical disc guide 33 of the alignment device has a diameter slightly smaller than the opening in the center of the optical disc 40 so that the optical disc can easily fit onto the circular flange of the alignment device. Preferably, the alignment device 38 comprises a number of alignment ears 37 equivalent to the number of tabs 37 of the transmitting disc 15. The alignment ears 37 of the alignment device preferably have a width at least one and one half times the width of the tabs 19 or at least sufficiently wide to cover the tabs of the transmitting disc 15 while they are packaged for sale to prevent damage to the tabs. During application of the tabs 19 to the optical disc 40, the transmitting disc 15 is rotated such that the tabs are not in contact with the alignment ears 37 of the alignment device 38 to provide easy removal of the protective cover 21 of the tabs and easy application of the inner portion 14 of the tabs to the non-data-read side of the optical disc. The round plate of the alignment device itself is substantially the same diameter (preferably between about 95 and 105% the same diameter) as the transmitting disc, and thus provides support for the transmitting disc and prevents bending damage during transportation and storage, as well as during application of the transmitting disc to the optical disc. If the alignment device were significantly

smaller than the transmitting disc, it would not provide such support and protection.

A second embodiment of this invention is shown in Fig. 6. The transmitting disc 50 includes a flange 51 extending upward from the outer diameter of the transmitting disc. The flange 51 has a height slightly greater than the thickness of the optical disc 40 and a lip 53 extending radially inwardly from the flange and parallel to the transmitting disc 50. The flange 51 and lip 53 frictionally engage the optical disc 40. The shape and rigidity of the flange 51 provide a circumferential gripping force sufficient to hold the transmitting disc 50 against the data-read side 41 of the optical disc 40. The relative flexibility of the transmitting disc 50 allows for easy application and removal from the optical disc 40.

Figure 7 shows a third embodiment of this invention. The means for holding the transmitting disc 60 on the data-read-side 41 of the optical disc 40 comprises flange means extending upwardly from the outer diameter of the transmitting disc for frictionally engaging the optical disc. The flange means comprises single continuous flange 63 extending upwardly from the periphery of the transmitting disc.

A fourth embodiment of the transmitting disc 70 is shown in Fig. 8. The flange means comprises a plurality of flanges 73 extending upward from the outer diameter of the transmitting sheet for frictionally engaging the optical disc 40. It is to be understood that other configuration grippers may be used without departing from the scope of this invention.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the

invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

CLAIMS

WHAT IS CLAIMED IS:

1. A protective cover for a laser-readable optical disc, the optical disc having a periphery, a data-read side, and a non-data-read side opposite the data-read side, the cover comprising:

a transmitting disc of material capable of transmitting light emitted by a laser, said transmitting disc being applicable to the data-read side of the optical disc to cover said data-read side, and

a gripper at the periphery of the transmitting disc for being disposed around the periphery of the optical disc and engaged with the non-data-read side of the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to the data on the optical disc.

2. The cover as set forth in claim 1 wherein said gripper comprises a plurality of tabs extending generally radially outwardly from the transmitting disc at spaced intervals around the periphery of the transmitting disc, each of said tabs being bendable around the periphery of the optical disc and securable to the non-data-read side of the optical disc.

3. The cover as set forth in claim 2 wherein the transmitting disc has an inside face for contacting the optical disc and an outside face opposite the inside face and wherein each tab comprises flexible sheet material having an adhesive on one face thereof, each tab having an inner portion in face-to-face adhesive engagement with the outside face of the transmitting disc

and an outer portion lying outward of the periphery of the transmitting disc, and wherein each tab has a protective cover on the adhesive on the outer portion thereof adapted to be peeled off to expose the adhesive on said outer portion.

4. The cover as set forth in claim 2 wherein said transmitting disc has a series of ears spaced at intervals around its periphery, said ears having outer edges on a circle centered in the center of the transmitting disc and having a diameter generally corresponding to the diameter of the optical disc, each tab being adhesively engaged with one of said ears.

5. The cover as set forth in claim 4 wherein said ears are integral with the transmitting disc.

6. The cover as set forth in claim 5 wherein the tabs are made of polyester.

7. The cover as set forth in claim 1 wherein said transmitting disc is made of a polycarbonate plastic.

8. The cover as set forth in claim 1 wherein said transmitting disc has a thickness between 0.002 inches and 0.006 inches.

9. The cover as set forth in claim 1 wherein said transmitting disc is approximately 92% transparent at wavelengths between 0.4 and 0.5 microns.

10. A cover for a laser-readable optical disc, the optical disc having a periphery, a data-read side, and a non-data-read side opposite the data-read side, the cover comprising:

a transmitting disc of material capable of transmitting light emitted by a laser, said transmitting disc being applicable to the data-read side of the optical disc to cover said data-read side, and

a plurality of tabs extending generally radially outwardly from the transmitting disc and being bendable around the periphery of the optical disc and adhesively securable to the non-data-read side of the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to data on the optical disc.

11. A cover for a laser-readable optical disc, the optical disc having a periphery, a data-read side, and a non-data-read side opposite the data-read side, the cover comprising:

a transmitting disc of material capable of transmitting light emitted by a laser, said transmitting disc being applicable to the data-read side of the optical disc to cover said data-read side, and

a gripper comprising a flange at the periphery of the transmitting disc for being disposed around the periphery of the optical disc and engaged with the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to data on the optical disc.

12. The cover of claim 11 wherein the gripper has a lip extending radially inwardly from said flange and generally parallel to the transmitting disc.

13. The cover as set forth in claim 11 wherein said flange comprises a plurality of spaced apart flange sections extending upwardly from the periphery of the transmitting disc.

14. A protective covering apparatus for a laser-readable disc, the optical disc having a periphery, a data-read side, and a non-data-read side opposite the data-read side, the apparatus comprising:

a transmitting disc of material capable of transmitting light emitted by a laser, said transmitting disc being applicable to the data-read side of the optical disc to cover said data-read side,

a gripper at the periphery of the transmitting disc for being disposed around the periphery of the optical disc and engaged with the optical disc to hold the transmitting disc generally flat against the data-read side of the optical disc without blocking transmission of light emitted by the laser to data on the optical disc; and

an alignment device comprising a generally round plate for supporting the transmitting disc, a transmitting disc guide on the plate for centering the transmitting disc on the alignment device and an optical disc guide on the plate for centering the optical disc on the alignment device, the transmitting disc guide and optical disc guide cooperating to facilitate proper alignment of the transmitting disc on the optical disc.

15. The apparatus as set forth in claim 14 wherein said gripper comprises a plurality of tabs extending generally radially outwardly from the transmitting disc at spaced intervals around the

periphery of the transmitting disc, each of said tabs being bendable around the periphery of the optical disc and securable to the non-data-read side of the optical disc, and wherein the alignment device comprises a plurality of alignment ears each corresponding to one of the plurality of tabs, the alignment ears extending radially outward from the round plate for supporting and protecting the gripper tabs.

16. The apparatus as set forth in claim 14 wherein said alignment device has a diameter substantially equal to the diameter of the transmitting disc for supporting the transmitting disc during storage and during application to the optical disc.

17. The apparatus of claim 16 wherein the transmitting disc guide comprises a raised circular flange adapted to fit within an opening formed in the center of the transmitting disc.

18. The apparatus as set forth in claim 17 wherein said optical disc guide comprises a raised shoulder adapted to fit within an opening in the center of the optical disc.

19. The apparatus as set forth in claim 15 wherein each of said alignment ears has a width at least one and one half times the width of each corresponding tab.

20. A method for applying a disc cover to an optical disc readable by a disc reader including a laser, the optical disc having a data-read side and a non-data-read side opposite the data read side, the method comprising:

placing a transmitting disc over an alignment device, the transmitting disc comprising a disc of material capable of transmitting light emitted by a laser and being applicable to the data-read side of the optical disc to cover said data-read side and having a plurality of tabs extending generally outwardly from the transmitting disc at spaced intervals around the periphery of the transmitting disc, the alignment device comprising a round plate having an outer diameter and a plurality of alignment ears extending radially outward and parallel to the plate, a transmitting disc guide for centering the transmitting disc on the alignment device and an optical disc guide for centering the optical disc on the alignment device;

placing the optical disc over the transmitting disc onto said optical disc guide of said alignment device; and

folding the tabs of the transmitting disc over the optical disc and securing the tabs to the non-data-read side of the optical disc.

FIG. 1

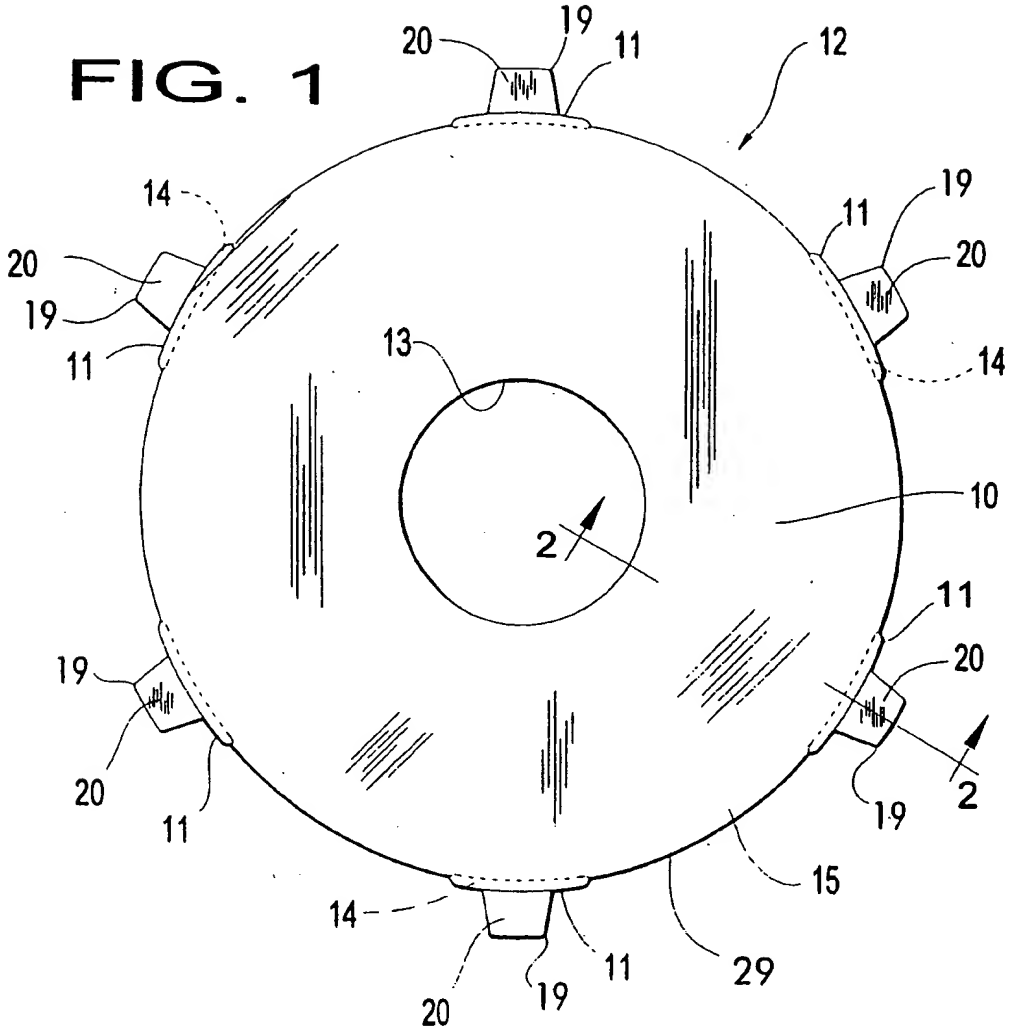
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FIG. 2

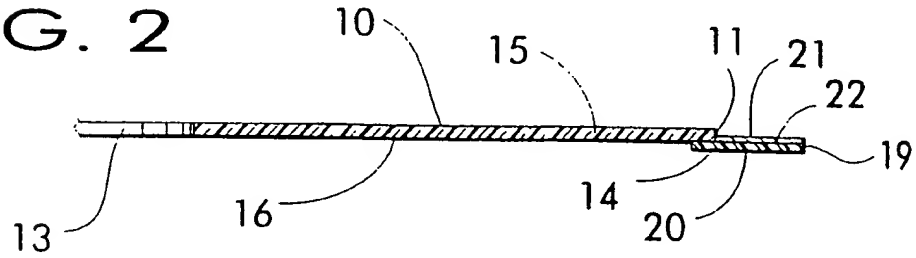
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FIG. 3

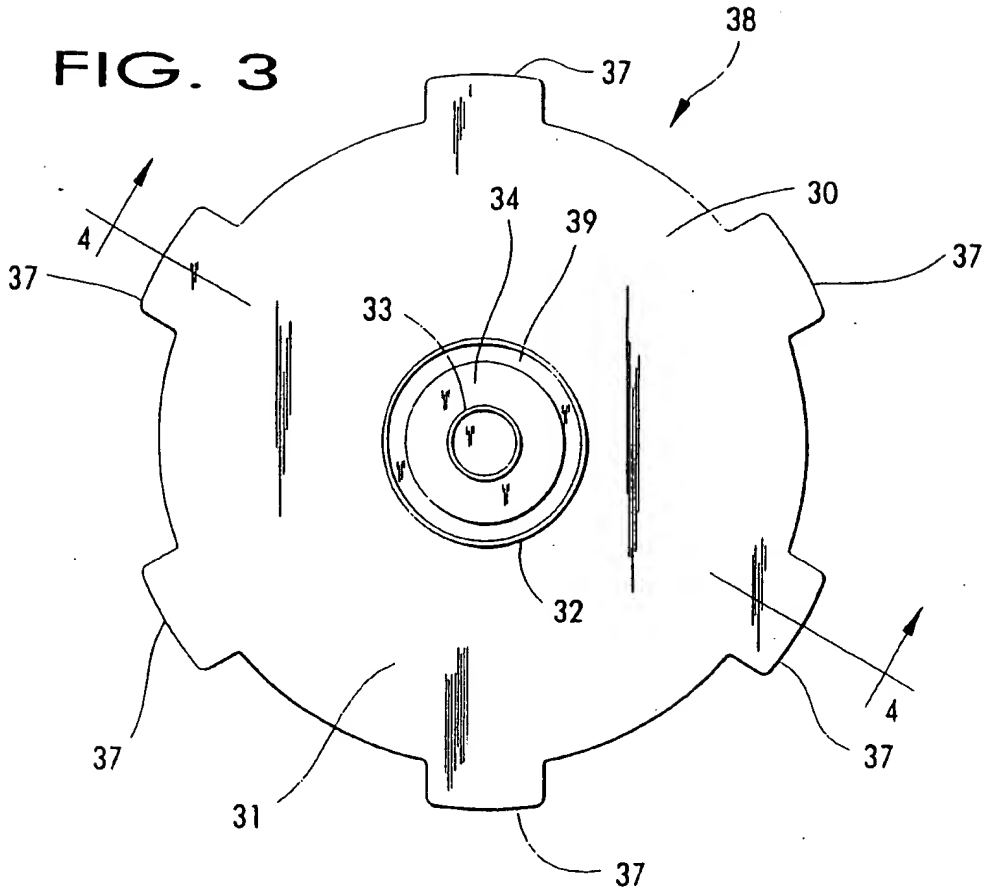

FIG. 4

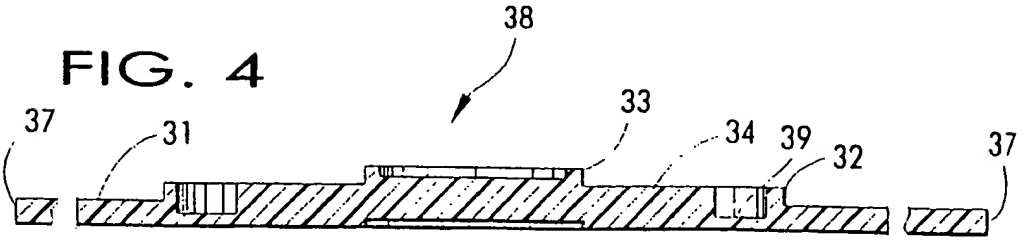

FIG. 5

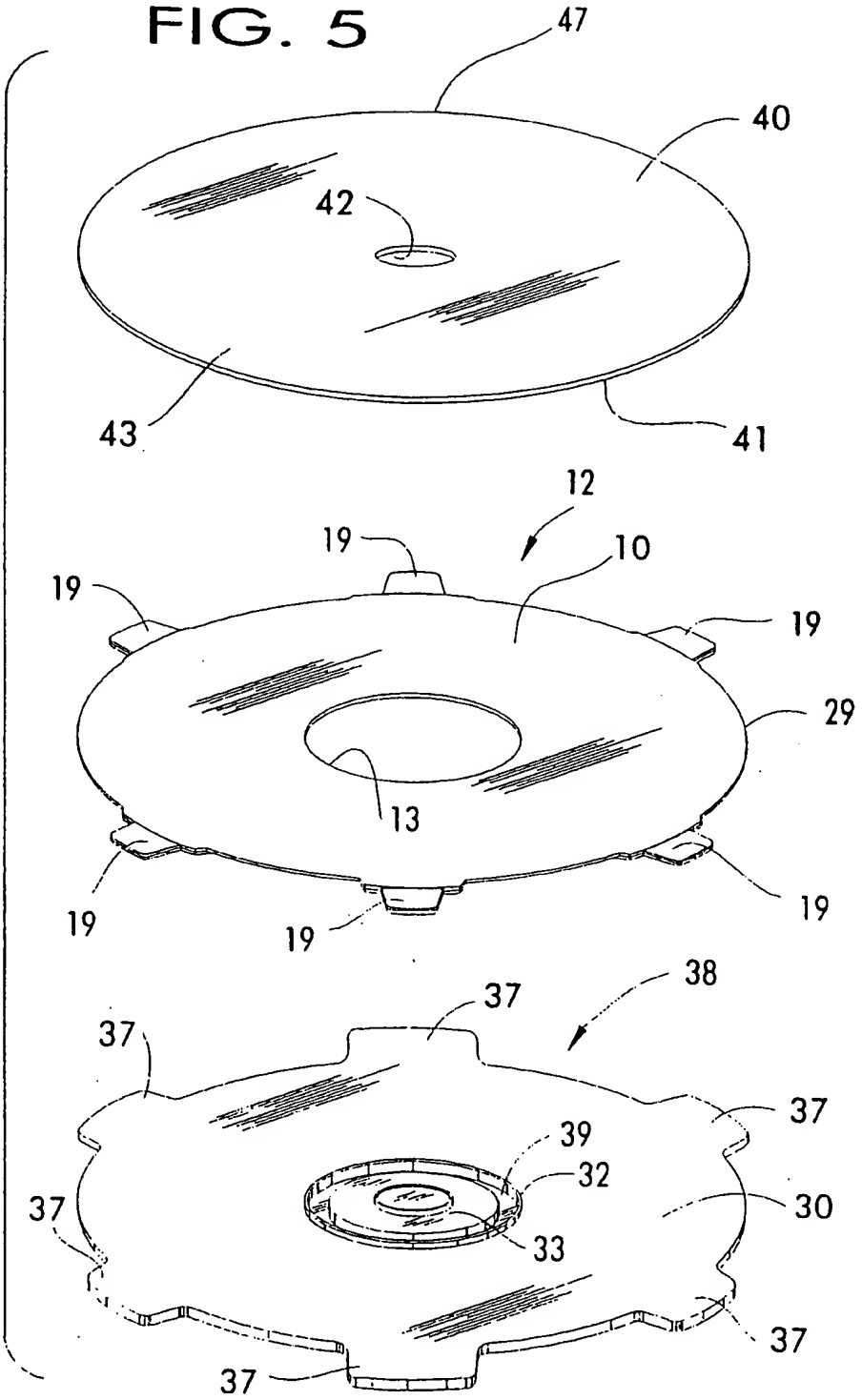
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FIG. 6

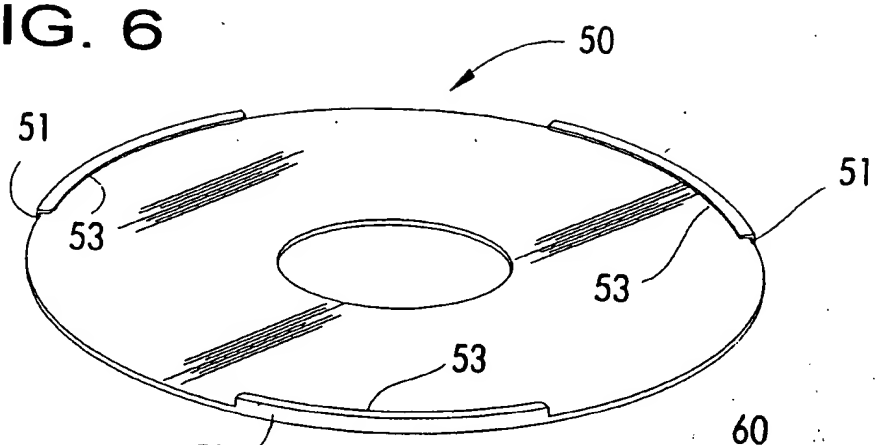


FIG. 7

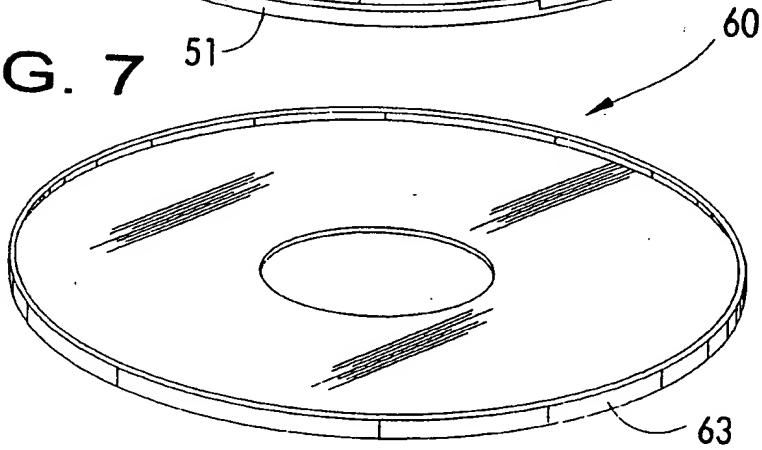
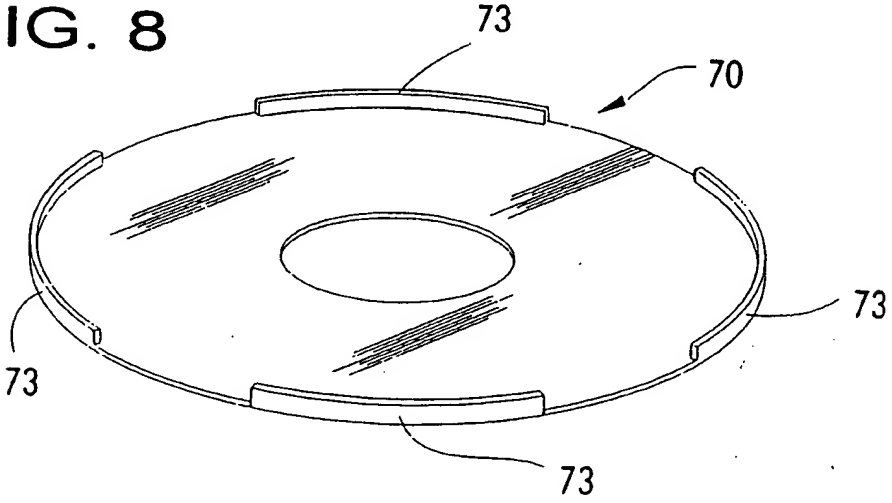


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/12307

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :G11B 7/26
US CL :369/291
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 369/291, 287, 289

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US, A, 4,556,968 (Pelkey et al) 03 December 1985, figure 4	1-6, 10-13 --------- 7-9, 14-20
Y	US, A, 4,879,710 (Iijima) 07 November 1989, figure 4.	7-9, 14-20
A	US, A, 5,020,048 (Arai et al.) 28 May 1991, figure 1.	1-20
A	JP, A, 1-124173 (Funahashi) 17 May 1989, figure 1.	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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